UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,300	01/27/2004	Stephen N. Hammond	6001.1001	9294

54621 7590 10/31/2005

KRIEG DEVAULT LLP
ONE INDIANA SQUARE
SUITE 2800
INDIANAPOLIS, IN 46204-2079

EXAMINER	
ALEXANDER, MICHAEL P	

ART UNIT	PAPER NUMBER
1742	

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/765,300	HAMMOND ET AL.	
	Examiner	Art Unit	
	Michael P. Alexander	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) *39-51* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34 and 36-38* is/are rejected.

7)☒ Claim(s) *35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *27 January 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-38, drawn to a method of carburizing, classified in class 148, subclass 225.

II. Claims 39-51, drawn to carburized product, classified in class 148, subclass 319.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by applying a cobalt plating to at least a portion of a surface of the steel object.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with John Allie on 4 October 2005 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-38. Affirmation of this election must be made by applicant in replying to this Office action. Claims 39-51 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Interpretations

The Examiner would like to set forth his interpretation of the recitation "removing the nickel plating" in claims 4-5, 29 and 32. Line 13 of page 15 of the specification of the instant application states, "after the annealing process the **entire** nickel plating is removed." The Examiner asserts that the absence of the word "entire" from the claim language evidences that the broadest reasonable interpretation of the recitation "removing the nickel plating" would include removing only a portion of the nickel plating, such as by machining.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-7, 10-11, 15-22 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramqvist et al. (US 4,013,487) in view of the ASM Handbook (Vol. 4).

Regarding claim 1, Ramqvist et al. teach (col. 2 line 30 – col. 3 line 37) a method of increasing the hardness of a steel object, comprising: applying a nickel plating to at least a portion of a surface of the steel object; subjecting the steel object to carburizing to allow carbon atoms to diffuse through the nickel plating and form a case portion; and heat treating the steel object after said subjecting. Ramqvist et al. do not specify that the hardened case region would have a hardness of at least Rc 50 at a depth greater than or equal to 0.012 inches.

Still regarding claim 1, the ASM Handbook (Vol. 4) teaches (363-364) that many factors affect case depth, including time, temperature, hardenability, and part shape or geometry. It would have been obvious to one of ordinary skill in that art to modify the method of Ramqvist et al. by optimizing the part shape or geometry or increasing the time, temperature and/or hardenability of the steel in order to increase the hardened case region to have a hardness of at least Rc 50 at a depth greater than or equal to 0.012 inches as taught by the ASM Handbook (Vol. 4).

Regarding claim 2, Ramqvist et al. do not specify that the hardened case region would have a hardness of at least Rc 50 at a depth up to about 0.090 inches. However, the ASM Handbook (Vol. 4) teaches (363-364) that many factors affect case depth,

including time, temperature, hardenability, and part shape or geometry. It would have been obvious to one of ordinary skill in that art to modify the method of Ramqvist et al. by optimizing the part shape or geometry and increasing the time, temperature and hardenability of the steel in order to increase the hardened case region to have a hardness of at least Rc 50 at a depth greater than or equal to 0.090 inches as taught by the ASM Handbook (Vol. 4).

Regarding claim 3, Ramqvist et al. teach (col. 5 lines 30-35) that the applying would include an electroless nickel process.

Regarding claims 4-5, Ramqvist et al. do not specify removing the nickel plating after the annealing and before further heat treating acts. However, it is well known in the art to conduct machining after annealing and before further heat treating acts as evidenced by the ASM Handbook (Vol. 4) (see page 714) because the annealed condition allows the steel to be easily machined. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. by machining after annealing and before further heat treating acts because the annealed condition allows the steel to be easilty machined as taught by the ASM Handbook (Vol. 4).

Regarding claims 6-7, Ramqvist teach (col. 3 lines 59-70) that the nickel plating would have a thickness of 5-20 microns, which overlaps with the claimed range, which is prima facie evidence of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art to select the claimed nickel plating thickness from the range of nickel plating thicknesses disclosed by Ramqvist et al. because Ramqvist et al. teaches the same utility throughout the disclosed range.

Regarding claim 10, Remqvist et al. do not specify that the carburizing would be vacuum carburizing including evacuating the carburizing atmosphere to a sub-atmospheric pressure, heating the steel object to the carburizing temperature, admitting carburizing gas into the carburizing atmosphere and drawing a further vacuum that begins with the admitting of carburizing gas into the carburizing atmosphere.

Still regarding claim 10, the ASM Handbook (Vol. 4) teaches (pages 348-349 and Fig. 1) a method of carburizing in a vacuum atmosphere including evacuating the carburizing atmosphere to a sub-atmospheric pressure, heating the steel object to the carburizing temperature, admitting carburizing atmosphere and drawing a further vacuum that begins with the admitting of carburizing gas into the carburizing atmosphere. The ASM Handbook (Vol. 4) further teaches that vacuum carburizing offers excellent uniformity and repeatability. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. by evacuating the carburizing atmosphere to a sub-atmospheric pressure, heating the steel object to the carburizing temperature, admitting carburizing atmosphere and drawing a further vacuum that begins with the admitting of carburizing gas into the carburizing atmosphere in order to have excellent uniformity and repeatability as taught by the ASM Handbook (Vol. 4).

Regarding claim 11, Remqvist et al. do not specify masking a portion of the steel object prior to said applying to prevent nickel plating on the portion of the steel object. However, the ASM Handbook (Vol. 4) teaches (page 321) using a lacquer to coat surfaces that are not to be plated prior to carburizing. It would have been obvious to

one of ordinary skill in the art to modify the method of Remqvist et al. by masking a portion of the steel object using a lacquer prior to said applying in order to prevent nickel plating on a portion of the steel object as taught by the ASM Handbook (Vol. 4).

Regarding claim 15, Remqvist et al. teach (col. 2 line 30 – col. 3 line 37, col. 5 lines 30-35) a method of processing a steel object, comprising: plating a surface of the steel object with an electroless nickel material; heating the steel the steel object to a carburizing temperature; and subjecting the steel object to carburizing wherein carbon atoms diffuse through the plating and form a hardened case region. Remqvist et al. do not specify removing at least a portion of the electroless nickel material after said subjecting. However, it is well known in the art to conduct machining after annealing and before further heat treating acts as evidenced by the ASM Handbook (Vol. 4) (see page 714) because the annealed condition allows the steel to be easily machined. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. by machining after annealing and before further heat treating acts because the annealed condition allows the steel to be easilty machined as taught by the ASM Handbook (Vol. 4).

Regarding claim 16, Remqvist et al. teach (col. 3 lines 22-37) performing post thermal (quenching and tempering) but do not specify that they would occur after machining. However, it is well known in the art to conduct machining after annealing and before further heat treating acts as evidenced by the ASM Handbook (Vol. 4) (see page 714) because the annealed condition allows the steel to be easily machined. It would have been obvious to one of ordinary skill in the art to modify the method of

Ramqvist et al. by machining after annealing and before further heat treating acts because the annealed condition allows the steel to be easilty machined as taught by the ASM Handbook (Vol. 4).

Regarding claim 17, Remqvist et al. teach (col. 3 lines 22-37) furnace cooling (i.e. annealing) the steel object after carburizing and quenching and tempering (post thermal cycles) after the annealing.

Regarding claim 18, Ramqvist teach (col. 3 lines 59-70) that the nickel plating would have a thickness of 5-20 microns, which overlaps with the claimed range, which is prima facie evidence of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art to select the claimed nickel plating thickness from the range of nickel plating thicknesses disclosed by Ramqvist et al. because Ramqvist et al. teaches the same utility throughout the disclosed range.

Regarding claim 19, the Examiner asserts that the plating of Remqvist et al. would inherently be substantially uniform. See claim 18 for meeting the claimed thickness limitation. Remqvist et al. teach (col. 3 lines 22-37) furnace cooling (i.e. annealing) after the carburizing (i.e. subjecting), quenching and tempering (i.e. hardening) after the annealing, and tempering after the annealing. Remqvist et al. does not specify "stabilizing" between the hardening and annealing, but the temperature of the steel would inherently because stabilized at the end of the quenching.

Regarding claims 20-21, Ramqvist et al. do not specify that the hardened case region would have a hardness of at least Rc 50 at a depth up to about 0.090 inches. However, the ASM Handbook (Vol. 4) teaches (363-364) that many factors affect case

depth, including time, temperature, hardenability, and part shape or geometry. It would have been obvious to one of ordinary skill in that art to modify the method of Ramqvist et al. by optimizing the part shape or geometry and increasing the time, temperature and hardenability of the steel in order to increase the hardened case region to have a hardness of at least Rc 50 at a depth greater than or equal to 0.090 inches as taught by the ASM Handbook (Vol. 4).

Regarding claim 22, Remqvist et al. teach (col. 3 lines 12-21) that the carburizing would occur at a between 800-1000 degrees C. The Examiner asserts that the nickel plating would inherently withstand the carburizing temperature without melting.

Regarding claim 24, Remqvist et al. teach (col. 3 lines 59-70) adjusting the thickness of the plating, which would inherently change the carbide structure within the hardened case region.

Regarding claim 25, Remqvist et al. teach (col. 3 lines 59-70) selecting the thickness of the nickel material, which would inherently have the result of selecting the carbide formation within the hardened case region.

Claims 8-9, 12-13 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Remqvist et al. in view of the ASM Handbook (Vol. 4) as applied to claims 1 and 15 above, and further in view of the ASM Handbook (Vol. 1).

Regarding claim 8, Remqvist et al. do not specify that the steel would be stainless steel. However, the ASM Handbook (Vol. 1) teaches (page 841) that stainless steel has better corrosion resistance than carbon steel. It would have been obvious to one of ordinary skill in the art to modify the method of Remqvist et al. by using stainless

steel because stainless steel has better corrosion resistance as taught by the ASM Handbook (Vol. 1).

Regarding claim 9, Remqvist et al. do not specify that the carburizing would be vacuum carburizing. However, the ASM Handbook (Vol. 4) teaches (col. 2 page 262) carburizing in a vacuum atmosphere in order to reduce the time required to achieve the case depth desired. It would have been obvious to one of ordinary skill in the art to modify the method of Remqvist et al. by carburizing in a vacuum atmosphere in order to reduce the time required to achieve the case depth desired as taught by the ASM Handbook (Vol. 4).

Regarding claim 12, see the rejections of claims 3, 5 and 7-9.

Regarding claim 13, Remqvist et al. teach (col. 3 lines 12-21) that the carburizing would occur at a between 800-1000 degrees C. The Examiner asserts that the nickel plating would inherently withstand the carburizing temperature without melting.

Regarding claim 26, Remqvist et al. teach (col. 3 lines 59-70) controlling the thickness in the plating, which would inherently control the formation of carbides in the case region. Remqvist et al. do not specify that the steel would be stainless steel. However, the ASM Handbook (Vol. 1) teaches (page 841) that stainless steel has better corrosion resistance than carbon steel. It would have been obvious to one of ordinary skill in the art to modify the method of Remqvist et al. by using stainless steel because stainless steel has better corrosion resistance as taught by the ASM Handbook (vol. 1).

Claims 27-30, 32-34 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramqvist et al. in view of the ASM Handbooks (Vols. 1 and 4).

Regarding claim 27, Remqvist et al. teach (col. 2 line 30 – col. 3 line 37, col. 5 lines 30-35) a method comprising: (a) applying an electroless nickel plating to a surface of a steel object and (d) heating the object to a carburizing temperature. Ramqvist et al. do not specify that the steel object would be stainless steel and Ramqvist et al. do not specify the vacuum carburization steps of: (b) placing the object within a mechanical housing; (c) evacuating the environment within the mechanical housing to a sub-atmospheric pressure; (d) heating the object within the mechanical housing to a carburizing temperature; (e) introducing a carburizing gas into the mechanical housing for a first period of time; (f) drawing a vacuum within the mechanical housing for a second period of time; and repeating acts (c) – (f) a plurality of times.

With respect to the steel object being stainless steel in claim 27, the ASM Handbook (Vol. 1) teaches (page 841) that stainless steel has better corrosion resistance than carbon steel. It would have been obvious to one of ordinary skill in the art to modify the method of Remqvist et al. by using stainless steel because stainless steel has better corrosion resistance as taught by the ASM Handbook (Vol. 1).

With respect to the vacuum carburizing process in claim 27, the ASM Handbook (Vol. 4) teaches (pages 348-349 and Figs. 1-2) a method of carburizing in a carburizing in a vacuum atmosphere by: (b) placing the object within a mechanical housing (see Fig. 2); (c) evacuating the environment within the mechanical housing to a sub-atmospheric pressure; (d) heating the object within the mechanical housing to a carburizing temperature; (e) introducing a carburizing gas into the mechanical housing for a first period of time; (f) drawing a vacuum within the mechanical housing for a

second period of time; and (g) repeating acts (c) – (f) a plurality of times. The ASM Handbook (Vol. 4) further teaches that vacuum carburizing offers excellent uniformity and repeatability. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. by (b) placing the object within a mechanical housing; (c) evacuating the environment within the mechanical housing to a sub-atmospheric pressure; (d) heating the object within the mechanical housing to a carburizing temperature; (e) introducing a carburizing gas into the mechanical housing for a first period of time; (f) drawing a vacuum within the mechanical housing for a second period of time; and (g) repeating acts (c) – (f) a plurality of times in order to have excellent uniformity and repeatability as taught by the ASM Handbook (Vol. 4).

Regarding claims 28-29, Ramqvist et al. do not specify removing the nickel-plating after the repeating and annealing and before further heat treating acts. However, it is well known in the art to conduct machining after annealing and before further heat-treating acts as evidenced by the ASM Handbook (Vol. 4) (see page 714) because the annealed condition allows the steel to be easily machined. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. by machining after annealing and before further heat treating acts because the annealed condition allows the steel to be easily machined as taught by the ASM Handbook (Vol. 4).

Regarding claim 30, the method of Ramqvist et al. in view of the ASM Handbook (Vol. 4) would inherently include a period of time after the repeating. The Examiner

considers this period of time to be a post-carburizing passive diffusion act to enable the carbon atoms to diffuse further into the object.

Regarding claim 32, Ramqvist et al. teach (col. 3 lines 22-37) annealing the object after carburizing. See the rejection of claims 28-29 for removing the nickel plating after the annealing. Ramqvist further teach tempering. Ramqvist et al. do not specify cooling the object to a temperature below room temperature after the hardening and before the tempering. However, the ASM Handbook (Vol. 4) teaches (page 203) cryogenic treatment of steel after hardening and before tempering in order to maximize the martensitic transformation. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist by cryogenically treating the steel after hardening and before tempering in order to maximize the martensitic transformation as taught by the ASM Handbook (Vol. 4).

Regarding claim 33, Ramqvist teach (col. 3 lines 59-70) that the nickel plating would have a thickness of 5-20 microns, which overlaps with the claimed range, which is prima facie evidence of obviousness. See MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art to select the claimed nickel plating thickness from the range of nickel plating thicknesses disclosed by Ramqvist et al. because Ramqvist et al. teaches the same utility throughout the disclosed range. Ramqvist et al. do not specify that the hardened case region would have a hardness of at least Rc 50 at a depth greater than or equal to 0.012 inches.

Still regarding claim 33, the ASM Handbook (Vol. 4) teaches (363-364) that many factors affect case depth, including time, temperature, hardenability, and part shape or

geometry. It would have been obvious to one of ordinary skill in that art to modify the method of Ramqvist et al. by optimizing the part shape or geometry or increasing the time, temperature and/or hardenability of the steel in order to increase the hardened case region to have a hardness of at least Rc 50 at a depth greater than or equal to 0.012 inches as taught by the ASM Handbook (Vol. 4).

Regarding claim 34, Ramqvist et al. do not specify that the hardened case region would have a hardness of at least Rc 50 at a depth up to about 0.090 inches. However, the ASM Handbook (Vol. 4) teaches (363-364) that many factors affect case depth, including time, temperature, hardenability, and part shape or geometry. It would have been obvious to one of ordinary skill in that art to modify the method of Ramqvist et al. by optimizing the part shape or geometry and increasing the time, temperature and hardenability of the steel in order to increase the hardened case region to have a hardness of at least Rc 50 at a depth greater than or equal to 0.090 inches as taught by the ASM Handbook (Vol. 4).

Regarding claim 37, Remqvist et al. teach (col. 3 lines 59-70) adjusting the thickness of the plating, which would inherently change the carbide structure within the hardened case region.

Regarding claim 38, Remqvist et al. teach (col. 3 lines 59-70) controlling the thickness of the nickel material, which would inherently have the result of controlling the formation of carbides in the case region.

Claims 14 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Renqvist et al. in view of the ASM Handbook (Vols. 1 and 4) as applied to claim 13 and 27 above, and further in view of Turner (US 5,000,368).

Regarding claims 14 and 36, Renqvist et al. do not specify that the nickel plating may have a composition of about 96 to about 98 nickel and about 2 to 4 percent phosphorus by weight percent. However, Turner a method of nickel plating using a nickel phosphorus alloy composed of about 88 to 98 percent by weight nickel and 2 to 12 percent phosphorus because such an alloy has a low melting point. It would have been obvious to one of ordinary skill in the art to modify the method of Renqvist et al. by using a nickel phosphorus alloy composed of about 88 to 98 percent by weight nickel and 2 to 12 percent phosphorus because such an alloy has a low melting point. The overlap of the disclosed range with the claimed range is prima facie evidence of obviousness. See MPEP 2144.05 I.

Regarding claim 36, the Examiner asserts that the carburizing temperature would inherently be below the melting point of the nickel plating.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Remqvist et al. in view of the ASM Handbook (vol. 4) as applied to claim 22 above, and further in view of Turner (US 5,000,368).

Regarding claim 23, Remqvist et al. do not specify that the nickel plating may have a composition of about 96 to about 98 nickel and about 2 to 4 percent phosphorus by weight percent. However, Turner a method of nickel plating using a nickel phosphorus alloy composed of about 88 to 98 percent by weight nickel and 2 to 12

percent phosphorus because such an alloy has a low melting point. It would have been obvious to one of ordinary skill in the art to modify the method of Remqvist et al. by using a nickel phosphorus alloy composed of about 88 to 98 percent by weight nickel and 2 to 12 percent phosphorus because such an alloy has a low melting point. The overlap of the disclosed range with the claimed range is prima facie evidence of obviousness. See MPEP 2144.05 I.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ramqvist et al. in view of the ASM Handbook (Vol. 4) as applied to claim 30 above, and further in view of Kubota (US 5702540).

Regarding claim 31, Ramqvist et al. in view of ASM Handbook (Vol. 4) do not specify that the drawing would commence upon the beginning of the introducing act. However, Kubota et al. teach (abstract) that the drawing would commence upon the beginning of the introducing act in order to keep down soot production. It would have been obvious to one of ordinary skill in the art to modify the method of Ramqvist et al. in view of the ASM Handbook (Vol. 4) by commencing the drawing upon the beginning of the introducing act in order to keep down soot production as taught by Kubota et al.

Allowable Subject Matter

Claim 35 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art teaches the basic concept of applying a uniform electroless nickel coating prior to carburizing, which would be obvious to combine with vacuum carburizing. However, the prior art does not suggest the detailed vacuum carburizing steps of: heating to a temperature of 1600-1700 degrees F; evacuating to about 1 torr, wherein the boost step is about one minutes and the drawing step is about four minutes, wherein the drawing commences when said introducing begins; and repeating for 520 times; wherein the detailed vacuum carburizing steps are combined with the uniform electroless nickel coating prior to carburizing and in combination with the claimed invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael P. Alexander whose telephone number is 571-272-8558. The examiner can normally be reached on M-F 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mpa

ROY KING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700